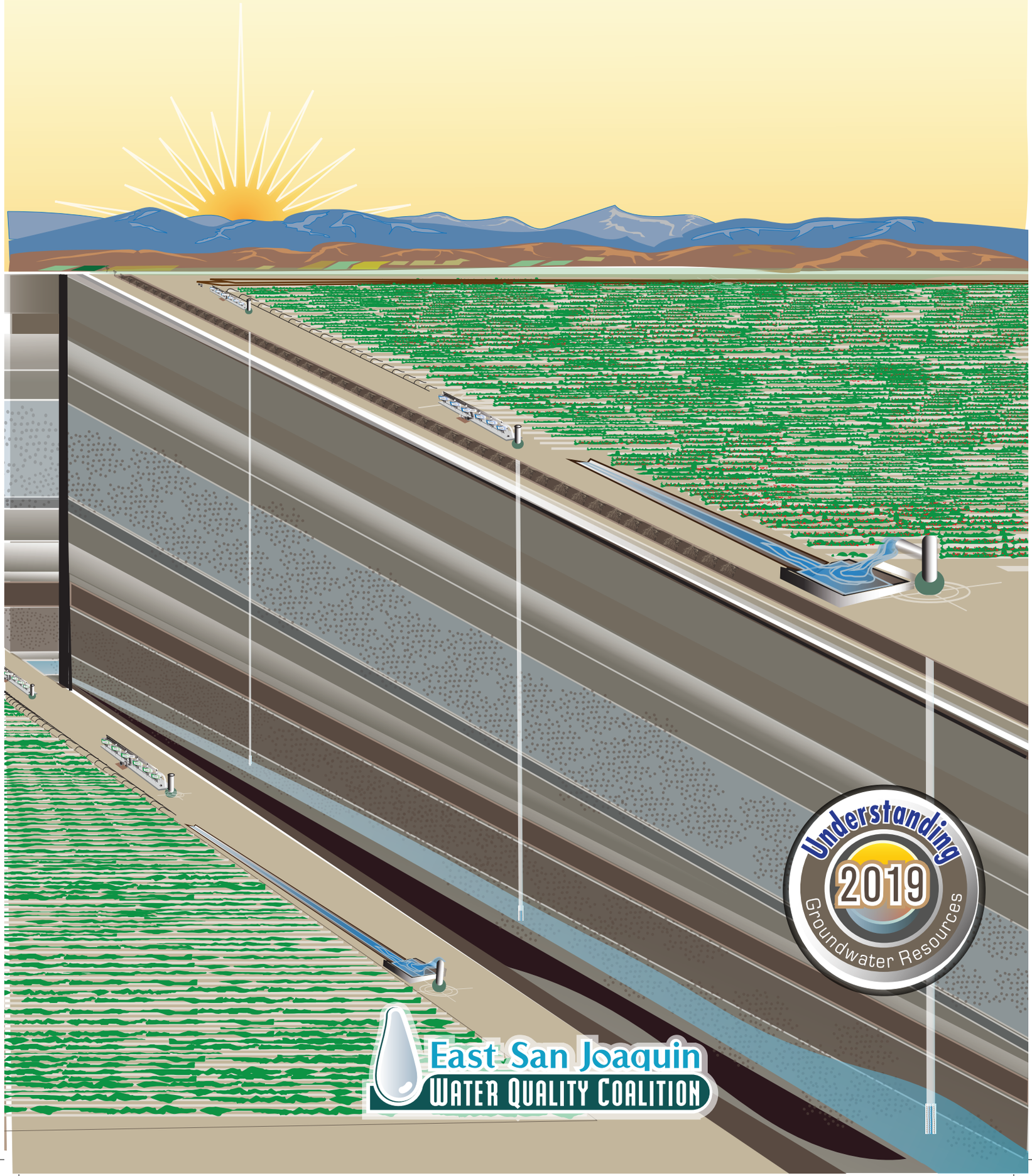
2019 MEMBER ANNUAL REPORT



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2019 Year in Review

End of Decade Sets Stage for Decades to Come

It's not often that a single government action sets the stage for the next 35 years but that's exactly what happened on October 16, 2019. That is when the State Water Resources Control Board adopted what is called the CV-SALTSS Basin Plan Amendment (BPA) (see details on pages 8-10). In brief, this new regulation gives irrigated agriculture 35 years to figure out how not to cause or contribute to groundwater contamination from nitrate. Before the BPA, the clock was already ticking on a 10-year deadline to accomplish that feat.

Admittedly, some low use nitrogen crops such as low tonnage wine grapes might be grown with little to no excess nitrogen moving past the root zone. Not so with our major acreage crops where moderate to high nitrogen applications are needed to produce profitable yields. The challenges for irrigated agriculture over the next 35 years are two-fold. The first challenge is to identify and verify which practices minimize the potential for excess nitrate to move past the root zone. Secondly, proving to the Water Boards (State and Regional) and the public that across the vast landscape called the Central Valley, irrigated agriculture is not causing or contributing to nitrate contamination of groundwater.

The first challenge is being addressed through the Irrigated Lands Regulatory Program as part of the Management Practice Evaluation Program (MPEP). Efforts are just beginning on the second challenge through development of Groundwater Protection Formulas, Values and Targets. Central Valley Coalitions in conjunction with the University of California, are combining efforts to develop those Formulas, Values and Targets for eventual review and approval by the State and Regional Water Boards. In next year's Annual Membership Report, we expect to have a full description of how that process will work and the responsibilities of growers operating in the High Vulnerability areas where Values and Targets will be applicable.

Another recent act by State water regulators expected to impact Coalition activities for decades to come is a change in how pyrethroid insecticides are measured in surface water. Using laboratory measurement methods mandated through the Pyrethroid Control Act (see page 20 for details), Coalition sampling is now finding these widely used insecticides in multiple waterways throughout the ESJWQC region. These pyrethroid detections are at extremely low levels – 4-5 parts per trillion – which makes the 14 parts per trillion standard for the now-banned chlorpyrifos insecticide seem high. Pyrethroid effects on invertebrates are "additive" which means that we are required to sum detected amounts and evaluate impacts to aquatic life. Levels in several waterways are high enough to trigger additional sampling throughout the Coalition region. Bottom line for growers using pyrethroid insecticides: take utmost care when applying near waterways.

Finally, a change of make-up for the ESJWQC Board of Directors is in the works, first through a change in the bylaws being voted on by members in early 2020. Later in 2020, we are hopeful a new "crop" of young growers will step forward and offer their time to serve on the ESJWQC Board (see page 3 for details). The existing Board, and those growers who served over the past 17 years, have guided the organization as it negotiated through this water regulation maze initiated in 2003. While impressive improvements in surface water quality have occurred across the region, the new requirements for ground and surface water will demand equally strong leadership over the next 17 years and more. Agriculture thrives largely because of the leadership shown by generations of farmers in this region.

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Coalition Overview

ESJWQC Bylaw Changes Underway

ESJWQC was formed in 2003 as a nonprofit membership organization with the intention of fulfilling the mandates of the Irrigated Lands Regulatory Program. The initial Board of Directors was made up of volunteers from agriculture who operated and worked in the five counties encompassed by the Coalition boundary. These Board members included growers, managers of the County Farm Bureaus in Stanislaus, Merced and Madera counties, and one representative each from the crop input industry and irrigation districts. In past years when a Board member resigned, the vacancy was announced at member meetings and existing Board members also sought applicants known to have potential interest in serving on the Board.

When the bylaws were revised in 2012, two Board member categories were created - five seats appointed by existing Board members and four seats elected by the voting members every two years.

The Board has now decided to propose additional amendments to the bylaws. Membership approval of the proposed amendments will be requested via mailed ballots going out in late January. The intent of the Board is to update the bylaws to more accurately reflect the geographic make-up of the membership and to increase the size of the Board so that more directors can be elected by the voting members. The proposed changes include:

- The total number of directors will be increased from 9 to 11;
- 6 directors will be elected by the voting members - 2 each from Madera, Merced and Stanislaus counties;
- 5 directors will be appointed by the Board.

If the proposed bylaws are approved by the membership, amended nomination/election procedures will be developed and distributed to members later in 2020.

New Board Members Sought for 2021 Ballot

The ESJWQC is seeking new Board members for consideration in a ballot anticipated for a vote in January 2021. The formal application process will be announced to the membership later in 2020. Nominees will need to be an ESJWQC voting member or designated representative of a member.

Voting Membership

As of January 2020:

- 3,291 landowner/operators
- 702,618 irrigated acres

Boundaries

The Coalition area includes Madera County and portions of Stanislaus, Merced, Tuolumne and Mariposa counties.

Fees Assessed by the State Water Resources Control Board

In 2019, the ESJWQC paid the 87 cents per acre fee for Coalition members to the State Water Resources Control Board to cover the cost of implementing the Irrigated Lands Regulatory Program, primarily for Regional Board staff. All members of agricultural coalitions throughout the state pay this annual fee. The per acre fee is included as part of Coalition membership dues.

Member Outreach and Best Management Practices

The Coalition is continuing its efforts to work with landowners in watersheds where surface water monitoring indicates problems. Central to this effort will be promoting Best Management Practices (BMPs) with the best potential for solving the problem. When a problem is identified, the Coalition will:

- Contact landowners upstream of the monitoring site and inform them of the constituent(s) identified.
- Distribute BMP information through mailings, individual visits, and local grower and crop advisor meetings.
- Give educational presentations on monitoring results and potential BMPs at commodity and farm group meetings in the Coalition region.

Monitoring Program Objectives

- Characterize discharge from irrigated agriculture in the Coalition region.
- Identify locations where water quality objectives are not being met (exceedances).
- Identify potential source(s) of the exceedances.
- Promote to landowners the implementation of management practices to eliminate water quality problem.

Financial Overview

Reported below is a financial overview presenting the ESJWQC 2018 audited financial statement numbers, and 2019 current income and expenses compared to budgeted amounts. The 2019 net income was higher than projected. As of December 31, 2019, there was approximately $1.88 million in ESJWQC banking accounts. A complete financial statement of 2019 expenditures is available upon request.

ESJWQC has contracted the services of Atherton & Associates, LLP, located in Modesto, to perform an audit of our financial statement for calendar year 2018. The CPA firm reported that the ESJWQC financial statements were "fairly presented in conformity with U.S. general accepted accounting principles." The audit report and audited financial statements are available upon request.

Summary of Financial Activities

Audited January 1, 2018 thru December 31, 2018, and January 1, 2019 thru December 31, 2019 Current vs. Budget:

	Audited 2018, $K (Thousands)	Current* 2019, $K (Thousands)	Budget 2019, $K (Thousands)	Description**
Total Income	$3,083	$3,273	$3,045	Membership dues plus interest on bank accounts in 2019
Expenses				
Program	2,981	3,058	3,650	Program manager, State Ag Waiver fees, site monitoring/special studies, quality control/assurance, executive director, membership management and correspondence, BMP assessment, and contractors doing work for the Coalition
Organizational	143	190	310	Insurance, legal, accounting, meetings, website, and miscellaneous business costs
Total Expenses	3,124	3,248	3,960	
Net Income (Loss)	$(41)	$25	$(915)	Difference between Total Income and Total Expenses

** Current 2019 includes an estimate of the 2019-2020 State Ag Waiver Fee that will be received February 2020.*

*** Some accounts have been reclassified to Program or Organizational based on recommendations by ESJWQC's auditors.*

Evaluating the Cost of Coalition Participation

Every year growers ask themselves questions about their farming operation:

- Was the money I spent on expenses necessary?
- Where can I cut costs?

Whether you grow trees/vines or row/field crops, a profitable farming operation can't survive unless a grower scrutinizes every dollar spent on expenses.

Over the last 15-20 years, "regulatory compliance" has become a significant and necessary expense for all farming operations: Workman's Compensation, Liability Insurance, Food Safety Security. Payments to Coalitions for the Irrigated Lands Regulatory Program fall under this category. And like Workman's Compensation, compliance with the ILRP is mandatory. Get caught for avoiding it and the consequences are costly. Expenses for regulatory compliance have become a fact of life wherever you farm in California.

And like any farm expense, regulatory compliance should be evaluated using a cost/benefit analysis.

Over the last two years, the ESJWQC and other water quality coalitions have been asked tough questions by their members about what has become a significant regulatory compliance expense:

- Was the money I spent on Coalition dues necessary?
- Where can the Coalition cut costs and reduce the annual dues?

Is Coalition Participation Necessary?

Since the Irrigated Lands Regulatory Program (ILRP) was launched in 2003 by the Central Valley Water Board, growers have had the option of joining a water quality coalition or obtaining an Individual Permit for their farming operation. Many growers have tried over the years to take the latter approach, both large and small acreage operations. But to date, the Regional Water Board has no Individual Permits for irrigated lands in the Central Valley.

There are good reasons why no one takes the Individual Permit route. For a 50-acre farm, the annual base fee paid to the State Water Resources Control Board is approximately $1400. For 250 acres, the annual fee is approximately $4000 and increases as the farm gets larger. In 2020, the State Water Board fee charged to Coalition members is $1.08 an acre. This amount is included in the per acre fee charged in Coalition annual dues.

The annual costs for regulatory coverage under the Individual Permit don't stop there. Each farm is required to monitor discharges to surface and groundwater (potentially from stormwater or irrigation). Additionally, nitrogen fertilizer usage and estimates of potential leaching of nitrate to groundwater must be done for each parcel. Finally, Individual Permit holders must prepare annual reports detailing their operations' farming practices and monitoring results, extremely technical documents that most farming operations could not prepare without hiring technical assistance. Estimated costs for those reports for a 250-acre farm range from $50,000 to $80,000 per year. All this data must be uploaded to public websites operated by the State where the information is labeled with the individual farming operation name and location.

The ESJWQC contracts with a consulting firm that specializes in compliance with Regional Water Board programs to handle member data submittals and surface/groundwater monitoring requirements. Monitoring and reporting costs make up approximately $2.50 per acre of the $4.00 an acre membership dues.

Holding the Line on Membership Dues

When the groundwater components were added to the ILRP in 2012, it was a significant expansion of the requirements for all growers in the Central Valley. Fortunately, the requirements have been phased in since adoption, enabling the Coalitions to develop streamlined monitoring and reporting responsibilities for its members. Still, activities such groundwater monitoring, collecting and analyzing nitrogen application information and evaluating management practices and their impact to groundwater are an ever-increasing compliance cost for Central Valley coalitions. Still ahead are significant – and costly -- efforts to understand and subsequently minimize the potential impact of irrigated agriculture on groundwater quality in the Central Valley. Still unknown is the future cost of agriculture's share to provide clean drinking water in communities impacted by nitrates and encompassed by Management Zones.

How long ESJWQC can maintain the $4.00 per acre fee is a concern each year for the Board of Directors. While the dues are set on

estimated costs plus maintaining reserves for unanticipated costs, it is not based on what other coalitions charge. However, comparing ESJWQC dues to other coalitions with a similar number of waterways being sampled shows that ESJWQC fees are about average (see chart below).

Economies of Scale Help Hold Down Costs

When ESJWQC was formed in 2003, those growers who came to the table to start the organization realized early on that complying with Water Board regulations was going to be a significant undertaking, particularly when it became apparent that technical complexities of monitoring and reporting could not be taken on by existing organizations in the region. Conversations with local wineries, food processors and city wastewater treatment plant operators – all regulated by the Water Board since the 1980-90s – warned us to be prepared for what ultimately became encompassed by the current Irrigated Lands Regulatory Program.

In 2003, the first ESJWQC Board of Directors convinced growers and agriculture organizations in the five counties encompassing the Coalition region that spreading operating costs across 700,000-plus acres and 3000-plus growers would help realize the highest economies of scale. More importantly, such an approach wouldn't overly burden growers with substantial fees. By comparing current ESJWQC dues with smaller acreage Coalitions with fewer water monitoring sites, the decision to encompass a larger area has proven to be correct.

Collaboration With Central Valley Coalitions

Efforts continue to hold down cost increases for ESJWQC members through collaboration with other Central Valley water quality Coalitions. These collaborative efforts enable splitting of expenses for shared fixed costs, such as technical consultants and attorneys. These activities include:

- Central Valley Groundwater Monitoring Collaborative
- Management Practice Evaluation Program
- Development of Groundwater Protection Formulas, Values and Targets
- CV-SALTS Prioritization and Optimization Study for salts
- Legal costs to counter challenges against the ESJWQC General Order adopted in 2012

Agricultural Water Quality Coalition	Irrigated Acreage[1]	# of Members[1]	Per Acre Fee ($)*
Sacramento Valley Water Quality Coalition	1,304,820	8,196	2.20 - 7.00***
Kings River Water Quality Coalition	806,344	4,171	3.00**
East San Joaquin Water Quality Coalition	700,385	3,106	4.00**
Kern River Watershed Coalition Authority	528,859	747	3.00 ($4.70)**
San Joaquin County and Delta Water Quality Coalition	517,873	3,384	4.00
California Rice Commission	499,000	2500	Based on mill assessment
Westlands Water District Coalition	491,908	1,301	1.82 (2-yr surplus)
Westside San Joaquin River Watershed Coalition	419,768	2409	6.19**
Tule Basin Water Quality Coalition	231,460	947	4.00
Kaweah Basin Water Quality Association	160,532	1235	6.20

[1] Source: www.waterboards.ca.gov/about_us/performance_report_1819/regulate/24111_irrigated_lands.html
*Most coalitions add a membership flat fee to acreage fees (the amount varies)
** Indicates reserves were used to offset full cost of program.
*** Handling charges or annual fees vary

ESJWQC Web Portal

Your Online Membership Management Tool

Web Address: www.esjmemberlogin.com

Get Started with 3 Easy Steps:

Step 1. Request a passcode by emailing ESJWQC staff at contactesj@esjcoalition.org or call (209) 846-6112.

Step 2. Navigate to website at address above

Step 3. Login using your email address and passcode. Personalize your passcode after logging in.

Features:

- Convenient 24/7 access to your membership information including enrolled parcels, invoice, and upcoming events.
- Update mailing preferences (paper or email)
- Assign Secondary Contacts to Parcels
- Complete and instantly submit your:
  - Nitrogen Management Plan (NMP) Summary Report to the Coalition
  - Complete past due reports

Questions?
Call (209) 846-6112 or email contactesj@esjcoalition.org

Member Portal Opening Page
Portal Overview

(1) Update your contact information associated with your membership.

(2) View the documents required to complete for the year. After reports are submitted, the status will update from "Outstanding" to "Completed."

(3) View a map of your enrolled parcels.

(4) View upcoming Coalition events: meetings, trainings and workshops.

(5) Complete the NMP Summary Report online.

(6) Complete the Farm Evaluation online.

(7) View all past Farm Evaluations and NMP Summary Reports submitted to the Coalition.

COMING SOON

Irrigation and Nitrogen Management Plan Online Worksheet
Real time and efficient data tracking
Input nitrogen applications throughout the year
Import INMP worksheet information into your INMP Summary Report

CV-SALTS Passage Sets Stage For Nitrate and Salt Control for Decades to Come

A Basin Plan Amendment* (BPA) covering nitrate and salt discharges from agriculture, industry and public agencies was adopted by the State Water Resources Control Board on October 16, 2019. ESJWQC representatives along with others regulated by Waste Discharge Requirements (WDRs) and environmental stakeholders participated in development of the regulatory framework that will shape nitrate and salt regulations for decades to come. Targeted revisions directed by the State Water Board to the Central Valley Water Board will occur in the next year.

**Amendments to Water Quality Control Plans for Sacramento River and San Joaquin River Basins and Tulare Lake Basin to Incorporate a Central Valley-Wide Salt and Nitrate Control Program. BPA developed through a stakeholder process called CV-SALTS (Central Valley Alternatives for Long-Term Sustainability).* *More details on pages 9-10*

However, in the meantime, key elements of the salt and nitrate control programs are in place and set to be rolled out by March 2020. The salt control program initiates a 10-year Prioritization and Optimization Study to identify regional solutions and is also set to begin in 2020. The nitrate control program sets a series of new requirements for certain prioritized areas.

Irrigated agriculture faces a particular dilemma that ultimately led to support of the new regulations: numerous studies show that it is virtually impossible to meet the nitrate drinking water standard (10 mg/l) below the root zone when applying nitrogen fertilizers to crops. While some practices show promise for minimizing nitrate leaching to groundwater, agriculture in many parts of the Central Valley is not able to meet the 10-year time frame for compliance with the drinking water standard mandated by the current WDR. If the timeframe can't be met, the Central Valley Water Board would be forced to either adopt discharge limits that are equal to the drinking water standard or issue Prohibition of Discharge against nitrate discharges that do not meet the standard.

Key to the new BPA is flexibility for the Central Valley Water Board to give agriculture and other dischargers up to 35 years to meet the nitrate water quality standard in discharges to groundwater. In exchange for the exception for meeting nitrate standards over the longer timeframe, WDR holders in priority basins must show that communities and others that rely on groundwater for their drinking water have access to drinking water that meets the drinking water standard. The BPA encourages implementation of these provisions through a cooperative approach referred to as Management Zones. In addition to showing access to safe drinking water, Management Zone participants must also show how nitrate discharges to groundwater are being managed. In addition to ESJWQC, other WDR permit holders expected to participate in Management Zones include dairies, wineries, poultry operations, cities and food processors.

All WDR holders in priority groundwater basins are expected to be notified of their obligation to comply with the nitrate control program in March 2020. Six priority basins were identified in the Central Valley through evaluation of existing groundwater nitrate levels. Of the six basins (Chowchilla, Kaweah, Kings, Turlock, Tule, and Modesto), three are located in the ESJWQC region (see maps pages 11-14).

At press time, the BPA was being reviewed by the State's Office of Administrative Law, a legal requirement for any new regulation. Once completed, the Regional Water Board has one year to make the targeted revisions to the BPA. In the meantime, notification of WDR holders will proceed.

The ESJWQC Board of Directors is still considering approaches for complying with the nitrate permitting program. Certain areas of the region will necessitate participating in a Management Zones due to widespread nitrate groundwater contamination that studies have linked in part to irrigated agriculture. Other areas may not need to follow this option. The Board will be making decisions on approaches for each basin in early 2020.

Groundwater Sustainability Authorities and CV-SALTS

A common question after presentations covering the CV-SALTS Basin Plan Amendments is whether Groundwater Sustainability Authorities (GSAs) should take responsibility for establishing Management Zones. The frequent answer: depends on the GSA. Since the Sustainable Groundwater Management Act (SGMA) was adopted, dozens of GSAs have formed in the Central Valley. In the ESJWQC region alone, there may eventually be more than 10 GSAs. In preliminary discussions with several GSAs, the answer ranges from "no way" to "possibly" to "let's keep talking." While the CV-SALTS BPA has language encouraging collaboration with GSAs and other government entities, it is not mandated. One significant difference between the two programs is the regulating authority; Management Zones are overseen by the Central Valley Water Board. GSAs are overseen by the Department of Water Resources. However, the commonality between the two programs is both programs will need support from irrigated agriculture. The ESJWQC Board of Directors is considering how in coming months and years the coordination can be developed to ensure no duplication of efforts. They believe it is imperative that there are discussions with the GSAs in the ESJWQC region but the level of coordination and cooperation will be driven locally.

New Nitrate Control Program Offers Choices for Compliance

Nitrate Challenge in the Central Valley

Over the last 150 years, increased agricultural, industrial, and municipal activities, coupled with population growth, have resulted in dramatic increases in nitrates in groundwater in the Central Valley. Many small communities in the Central Valley rely on groundwater for drinking water. Some communities can't safely use groundwater for drinking water as nitrate levels present a potential for human health impacts. The Central Valley Regional Water Quality Control Board (Regional Board) regulates nitrate discharges to groundwater from these activities. Improved management practices have been implemented to reduce nitrate discharges, but compliance with current regulations is difficult to impossible. New, updated regulations have been developed through the CV-SALTSS initiative.

CV-SALTSS Initiative

The CV-SALTSS (Central Valley Salinity Alternatives for Long-Term Sustainability) was formed more than a decade ago as a collaborative stakeholder group tasked with developing a sustainable salt and nitrate management program for the Central Valley. In 2008, the Central Valley Salinity Coalition was established to help fund the needed scientific and technical studies.

New Nitrate Control Program

On May 31, 2018, the Regional Board approved amendments to the Central Valley's Water Quality Control Plans or Basin Plans which include the new Salt and Nitrate Control Programs. On October 16, 2019, the State Water Resources Control Board (State Board) also approved the amendments. The Office of Administrative Law is anticipated to approve the amendments in January 2020.

The Nitrate Control Program is a prioritized program. The Regional Board will implement the Nitrate Control Program beginning with the identified Priority 1 groundwater basins/subbasins of Kaweah, Turlock, Chowchilla, Tule, Modesto, and Kings. In March 2020, Notices to Comply are expected to be mailed to nitrate dischargers. Priority 2 groundwater basins /subbasins are Yolo, Merced, Kern County (west side south), Tulare Lake, Kern County (Peso), Delta Mendota, Eastern San Joaquin, and Madera. Notices to Comply will be mailed between late 2022 and late 2024.

Nitrate Control Program Goals

1. **Provide safe drinking water supplies as the priority.**
2. **Reduce nitrate impacts to water supplies.**
3. **Restore groundwater quality.**

The Nitrate Control Program provides the Regional Water Board with revised, more flexible authorities for nitrate regulation, including:

- Exceptions for dischargers in meeting the nitrate water quality objective,

- Establishment of management zones to foster collaborative nitrate solutions, and
- Offset Projects for groundwater as an alternative means of achieving compliance with Waste Discharge Requirements (WDRs).

Two Nitrate Compliance Pathways for Dischargers to Choose

Once nitrate dischargers receive a Notice to Comply with the Nitrate Control Program, they have a choice of two pathways for compliance -- Pathway A – Individual Permitting or Pathway B – Local Management Zone. After receiving a Notice to Comply, dischargers must choose a pathway.

Pathway A: Individual Permitting Approach

A discharger or groups of dischargers subject to a single order may opt to comply under the individual permit requirements that:

- Defines requirements to protect shallow groundwater,
- Establishes five discharge categories and associated compliance requirements, and
- Establishes trigger levels for consideration
- When applicable, dischargers opting for Pathway A may also need to ensure that those impacted by nitrates have safe drinking water.

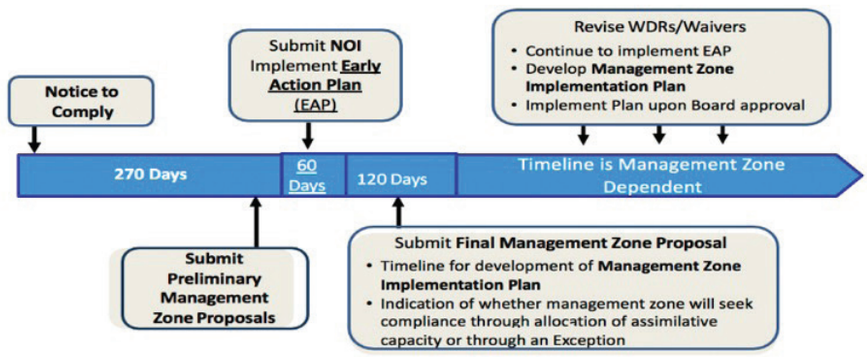
Pathway B: Management Zone Permitting Approach

For those dischargers that cannot meet the Pathway A more conservative approach, they must use Pathway B. Dischargers opt to work collectively with other dischargers through a management zone. The management zone is a defined area, e.g., a portion of a larger groundwater basin/subbasin. A management zone serves as a discrete regulatory compliance unit for nitrate compliance. Dischargers would ensure that those impacted by nitrate have safe drinking water within the zone while continuing to implement best practices and nitrogen management plans. In turn, dischargers may be allowed greater flexibility and more time to achieve nitrogen balance and restore nitrate affected water bodies.

Joining a management zone offers several key benefits for dischargers choosing to work together to achieve compliance:

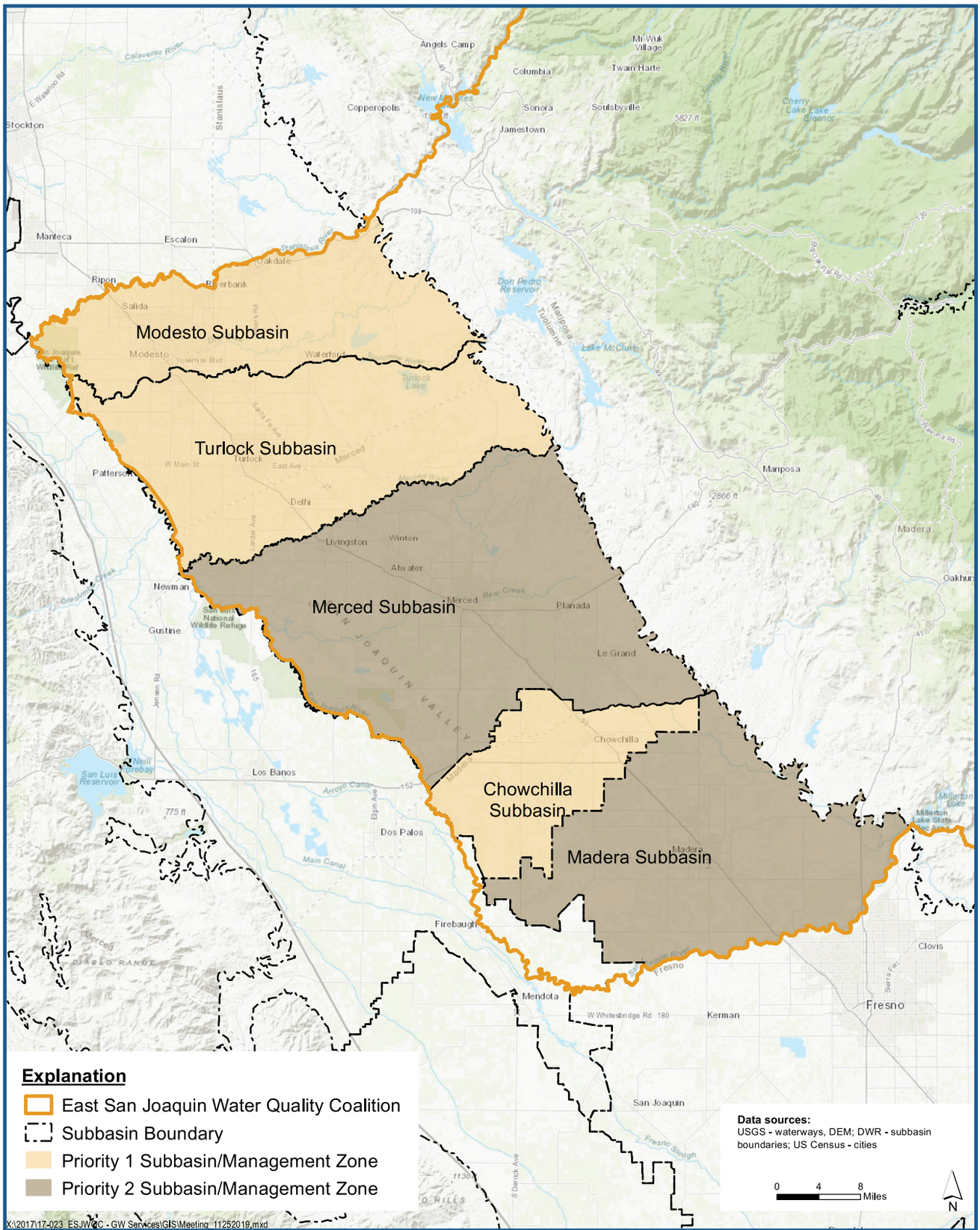
- Promotes coordinated water resource management among various dischargers as well as others.
- Promotes prioritization of resource allocation, which translates to more efficient use of funds.
- Working collectively to ensure that much-needed safe drinking water is provided to those residents adversely affected.
- Early Action Plan (EAP) (see more below) 6provide an alternative compliance opportunity for those who cannot comply with nitrate standards or for whom participating in a management zone in their local area is a better business decision than trying to demonstrate compliance alone.

Timeline for Forming Management Zones in Priority 1 Groundwater Basins/Subbasins



Early Action Plans

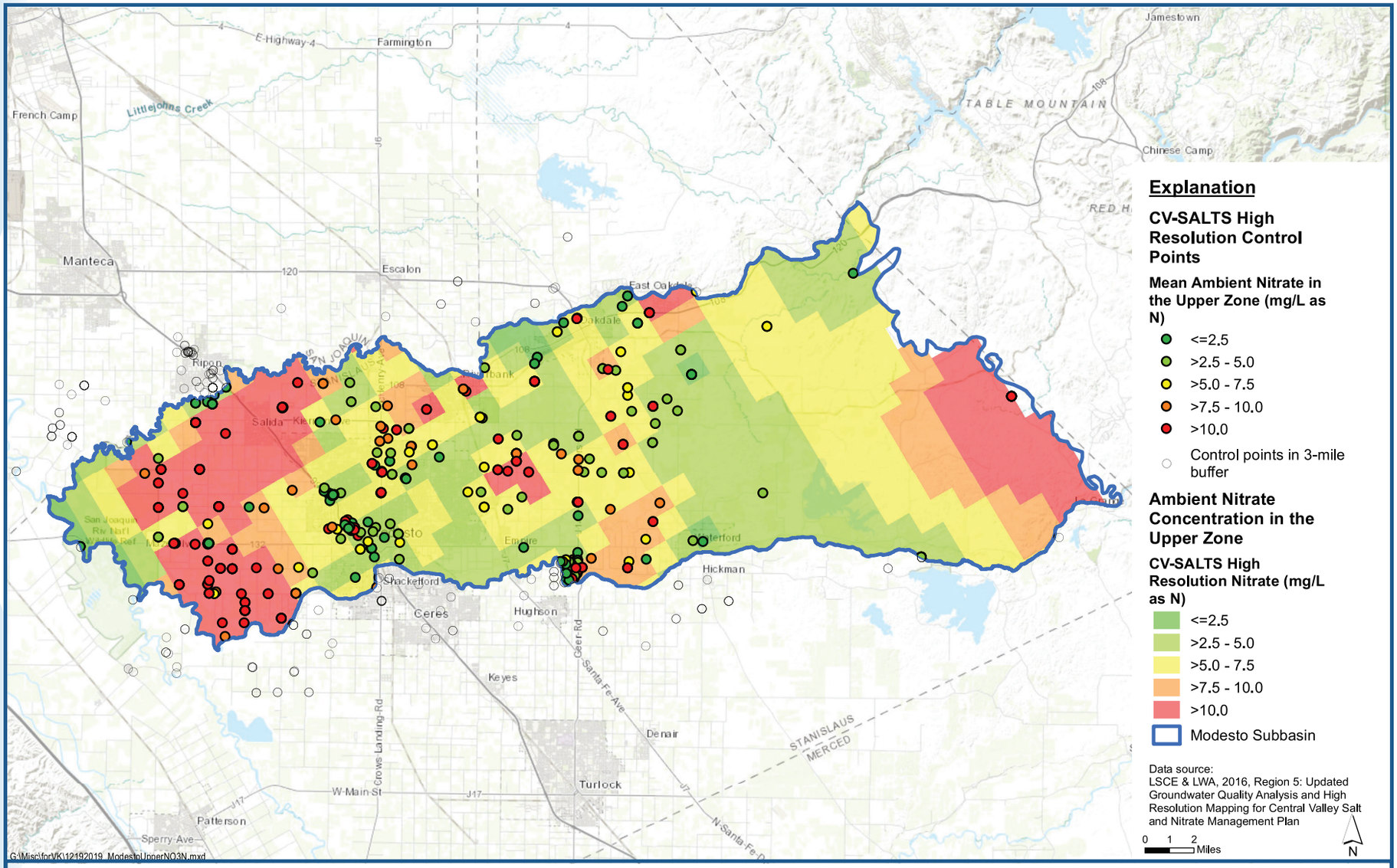
Regardless of whether choosing Pathway A or Pathway B, all dischargers must assess nitrate levels to ensure safe, reliable drinking water by monitoring groundwater used for municipal supplies that may be affected by nitrate discharge(s). If affected, and where the discharger(s) is causing an exceedance of nitrate, then the discharger(s) will submit an EAP. The EAP includes specific actions and an implementation schedule to address the immediate needs of those with groundwater that exceeds the nitrate drinking water standard. EAPs will ensure that the first goal of the Nitrate Control Program—to address drinking water issues first—is achieved by allowing participants to work together regionally to meet this need, saving money and sharing costs as locally appropriate.



Luhdorff & Scalmanini Consulting Engineers

Priority 1 and 2 Management Zones

East San Joaquin Water Quality Coalition



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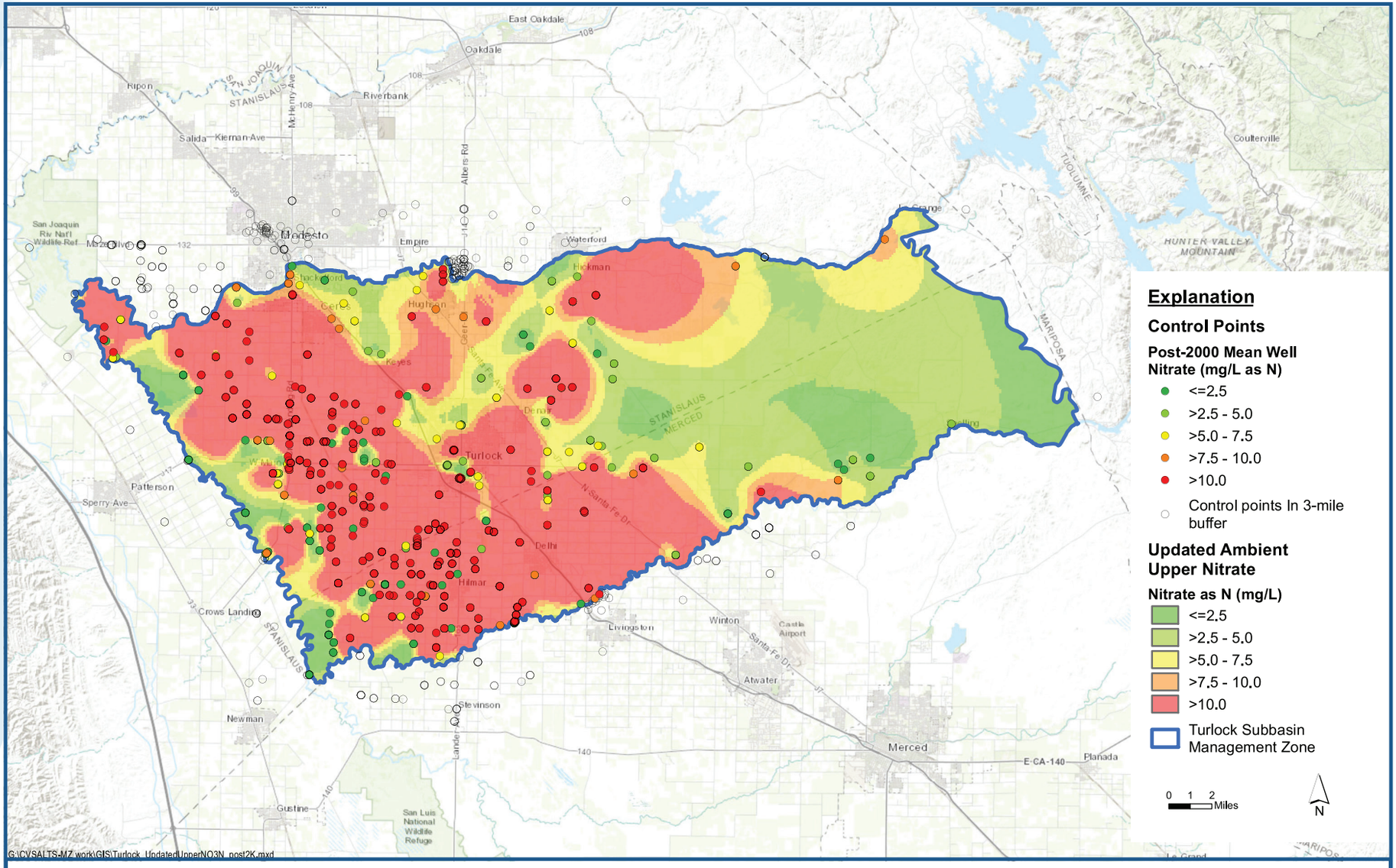
Ambient Groundwater Nitrate in the Upper Zone
Modesto Subbasin

From CV-SALTS High Resolution Work
(LSCE, 2016)



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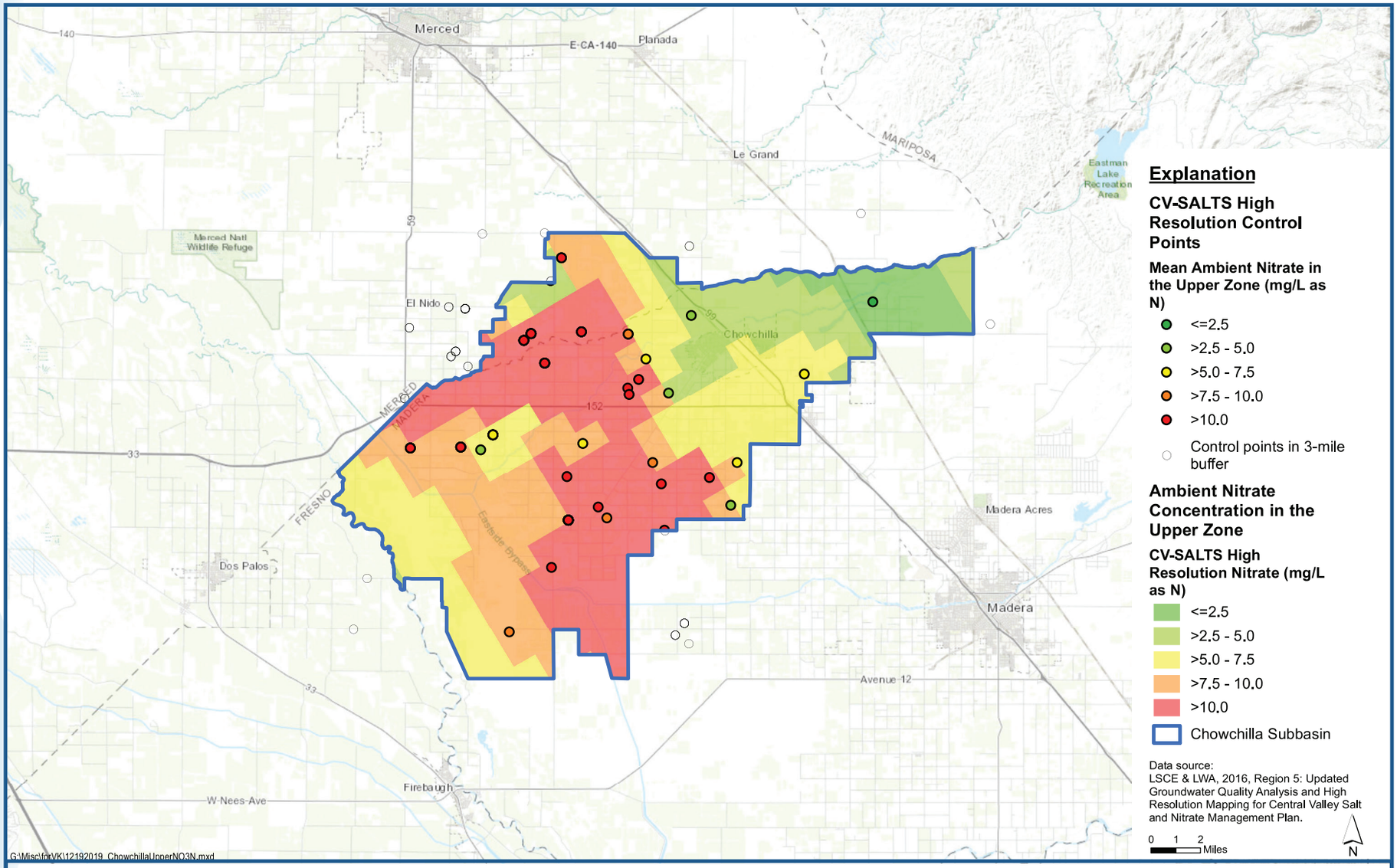
Updated Ambient Post-2000 Nitrate Concentration in the Upper Zone
Turlock Subbasin Management Zone

CV-SALTS
Prelmiinary MZ Proposal



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Ambient Groundwater Nitrate in the Upper Zone Chowchilla Subbasin

From CV-SALTS High Resolution Work (LSCE & LWA, 2016)

2019 Nitrogen Summary Report Identified Outlier Parcels

2019 is the first year that Outlier parcels were identified to the Regional Water Board in the Coalition annual Nitrogen Management Plan (NMP) Summary Report. Important points in the report:

- No member names are associated with the information; instead, each field is labeled with an anonymous member ID number.
- An Outlier designation is calculated based on three years of parcel A/R ratios: 2016, 2017 and 2018 crop year.
- ESJWQC received 98% of NMP Summary Reports from members located in a high-vulnerability areas (non-responders can expect to be contacted by the Regional Water Board and potentially face enforcement action).

The Regional Board approved the submittal as fulfilling the coalition requirement for the NMP Summary Report.

Good	Reasonable	Poor
Almonds	Grapes	Hay
Pistachios	Walnuts	Figs
Silage, Corn	Grapes, raisins	Cherries
Hay, Alfalfa	Peaches	Grains, Corn
Silage	Citrus	
Potatoes	Greens	
Tomatoes	Olives	
Grains		
Cotton		
Prunes		

Determining Nitrogen Removed (R) With Nitrogen Crop Coefficients

The Coalition uses crop-specific nitrogen coefficients to convert crop yields to nitrogen removed values. These nitrogen crop coefficients are based on studies performed by the University of California (UC) through a project supported by the California Department of Food and Agriculture.

A crop nitrogen coefficient is based on nitrogen removed as harvested yield (and stored in wood in perennial crops).

A/R = Nitrogen Applied divided by Nitrogen Removed*

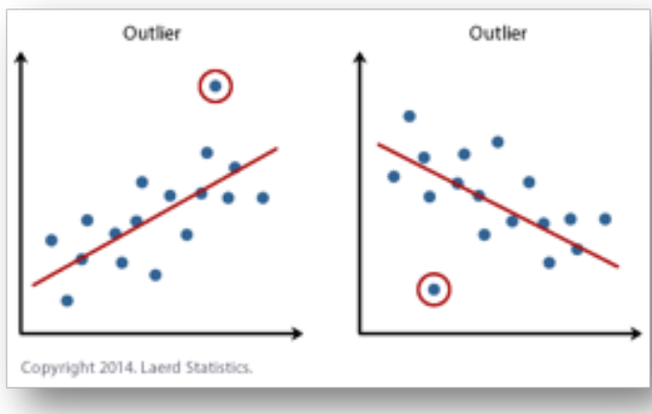
*Calculated number

The Coalition technical consultants performed an independent analysis of the UC report and ranked the nitrogen removed values based on several factors. Of the 79 nitrogen crop coefficients compiled by UC, the Coalition ranked 13 values as good, 26 as reasonable, and 24 as poor (see chart on left.)

How Are Outliers Determined?

An NMP Outlier is determined by using a mathematical calculation with nitrogen application information called the adjusted Interquartile Range (IQR) method. The Coalition combines three years of NMP information and compares parcels to a threshold determined by the adjusted IQR for each crop in the Coalition region.

The IQR method is preferred because it compares information across a wide range of sample sizes and data distributions. The IQR method for determining Outliers is also used by other Central Valley Coalitions including the San Joaquin County and Delta Water Quality Coalition, Westside San Joaquin River Watershed Coalition, and Westlands Water Quality Coalition.



Why Outlier Parcels Are Identified

Parcels are designated as Outliers for one primary reason: significantly more nitrogen is being applied to the crop than is removed in harvest or with perennial crops, removed in harvest and stored in wood. The "excess" nitrogen could potentially be leached through the soil profile to groundwater. Nitrogen in groundwater is considered a contaminant despite its necessary and beneficial use in crop production. While there may be reasons why there is excess nitrogen when comparing applied nitrogen versus removed – lower yields due to pest or weather damage for example – the Outlier designation is currently the best indicator of potentially excess nitrogen being applied to a parcel.

All water quality coalitions in the Central Valley are required as part the Irrigated Lands Regulatory Program to identify Outlier parcels and encourage operators of those parcels to use management practices to minimize the amount of excess nitrogen moving past the root zone.

Outlier Definition

The term outlier is used in statistics to mean a data point that is outside the normal range of all other data points in the population. Central Valley Coalitions use this term for parcels where more nitrogen is applied to the crop versus the reported yield in comparison to other parcels planted to the same crop (each Coalition only compares parcel data in their region). This is currently the best method to indicate if there may be excess nitrogen applications compared to yields. The Regional Water Board is allowing Coalitions to adjust or modify this approach if after several years it becomes apparent that a better method of calculation could be used.

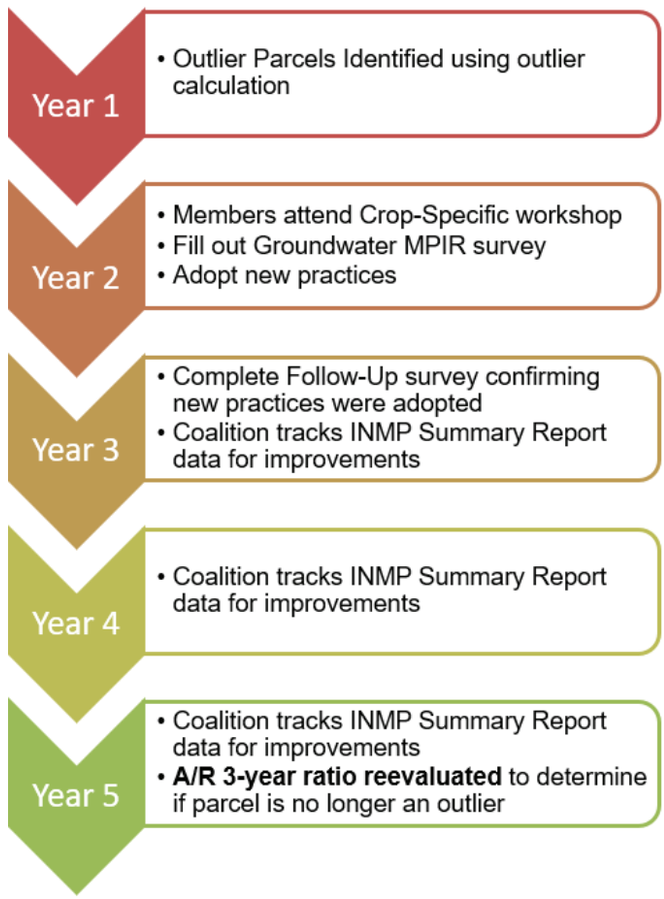
Planned Outreach for Members with Outlier Parcels

In 2020, ESJWQC begins a program of identifying outlier parcels and conducting outreach to members who farm those parcels. Key components of the program include:

- Organizing crop-specific workshops for members with Outlier parcels;
- Completing a Management Practice Implementation Report (MPIR);
- Promoting efficient nitrogen application practices.
- Monitoring INMP member data to evaluate if improvements are being made.

Crop-Specific Workshops

At the crop-specific workshops, the Coalition staff, along with crop experts, will present the most current information on nitrogen fertilizer management. This information will cover irrigation techniques plus nitrogen fertilizer types and application practices. The goal is to offer growers the most current approaches and techniques to minimize the potential for excess nitrogen being applied that could potentially leach beyond the root zone and into groundwater.



Management Practice Implementation Report (MPIR)

The Coalition technical team with the help from local crop advisors developed a survey that includes a wide range of nitrogen management practices considered to be efficient ways to apply this important crop nutrient. At each workshop, members will be asked to complete and turn in the MPIR survey. On the survey, members will indicate practices used on the Outlier parcels as well as practices they plan to adopt as a result of the information received at the workshop. A year following the crop-specific workshop, members who indicated on their MPIR survey they would implement additional practices will be mailed a follow-up survey to confirm the practices were implemented.

Annually, the Coalition will track improvements in members' A/R ratios on the Outlier parcels as a result of outreach. Three years after new management practices have been implemented, the Coalition will re-evaluate each members A/R 3-year ratio to determine if improvements were made.

If A/R 3-year ratios do not improve after Groundwater Focused Outreach, the Coalition may be required to submit grower contact information to the Regional Water Board for follow-up.

This Focused Outreach approach is a five-year process (see timeline to the right). Members will be responsible for attending the crop-specific workshop and completing surveys required in year 2 and 3 of the process.

What if I am NOT an Outlier?

Members with no outlier parcels will not need to complete the MPIR surveys or attend crop-specific workshops. If a parcel is near the outlier threshold, the Coalition recommends that you consult with a nutrient management specialist to prevent being considered an outlier in the future.

Focused Outreach Crop Prioritization Schedule

In 2020, the Coalition is focusing time and resources to first contact members with outlier parcels planted to almonds. Because the Coalition cannot feasibly conduct workshops for all crop types with outlier parcels, outreach will be phased by high acreage crops grown in the Coalition region (see crop prioritization schedule below).

2020- Almonds

2021 - Grapes, Pistachios, Walnuts

2022 - Sweet Potatoes, Corn, Tomatoes

2023 - Figs and Alfalfa

2024 - Peaches and Prunes

Farmer's Nutrient Online Management Resources

UC Davis Fruit & Nut Research & Information Center

fruitsandnuts.ucdavis.edu

Find general crop information from Newsletters, Articles, & Blogs

CDFA Fertilizer Research Education Program (FREP)

www.cdfa.ca.gov/is/ffldrs/frep/

Provides specific crop fertilizer recommendations for all stages of plant maturity

INMP Self-Certification Classes

www.curesworks.org/grower-training/

4-hour training put on by CCAs so you can self-certify your INMP Worksheet

Continuing Education Courses

https://www.curesworks.org/cecourses/

Provides schedule of courses in the Central Valley offering Continuing Education Units

Groundwater Quality Trend Monitoring

The purpose for monitoring shallow groundwater is to determine current water quality conditions relevant to irrigated agriculture and to evaluate the regional effects of farm practices on groundwater over time.

Wells selected for trend monitoring draw water from the Upper Zone of the aquifer above the Corcoran Clay layer. Within the high vulnerability areas in the ESJWQC region, the depth to the bottom of the Upper Zone is between about 40 and 300 feet below ground surface.

In 2017, Luhdorff and Scalmanini (consulting firm hired by the Coalition) finalized a list of member wells to be included in the Groundwater Quality Trend Monitoring Network. Twelve member wells (Principal wells) met the three criteria listed in the WDR and were sampled in 2018. By 2019, the Coalition added an additional nine wells to the network for a total of 21 monitoring wells.

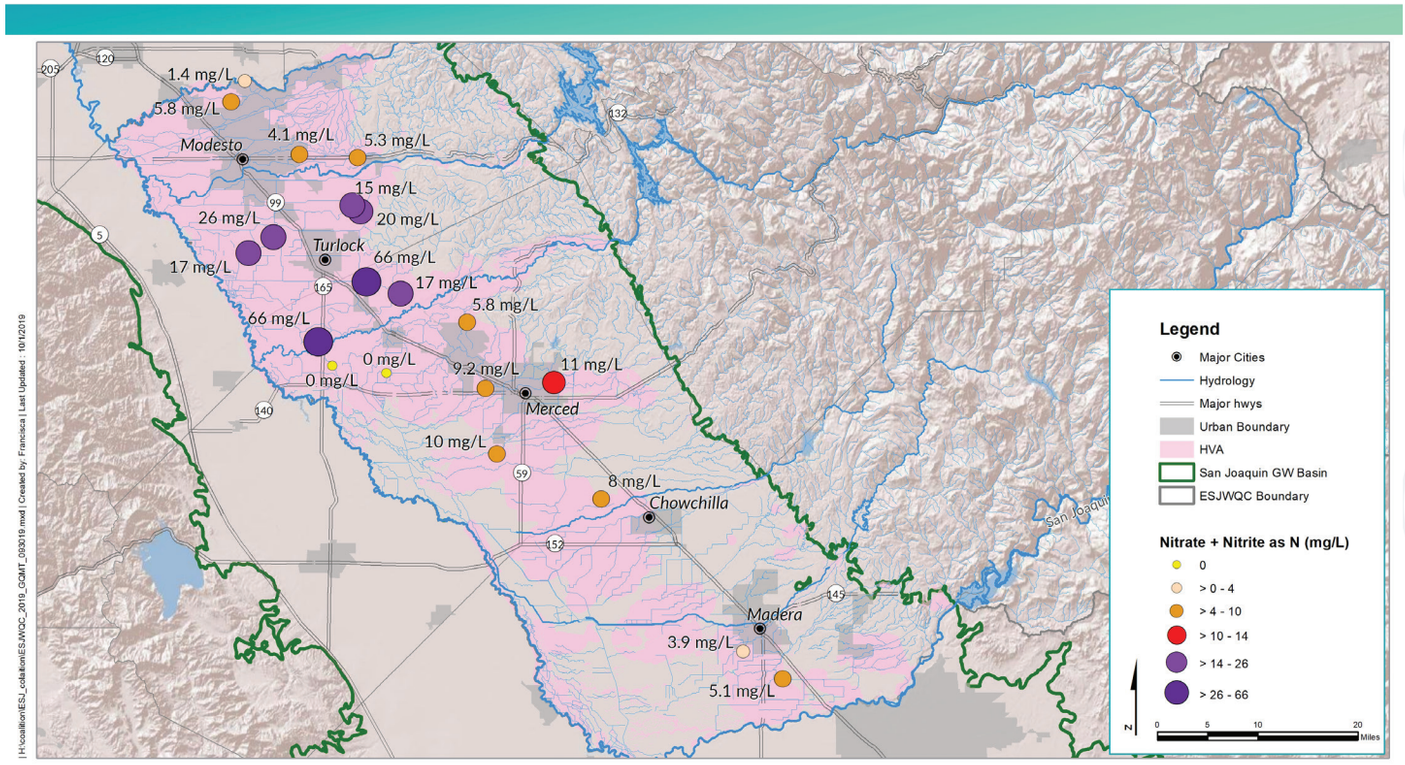
In addition to member wells, the Coalition is using well monitoring data from 74 public supply wells (Complementary wells) throughout the region. The network of wells includes a combination of municipal drinking water wells, dedicated monitoring wells already in existence, and domestic or irrigation wells belonging to members.

2019 Trend Monitoring Results

The Coalition sampled twenty member wells from July 22-24th, 2019. Results from the monitoring event are shown on the map at bottom of this page. In general, eight of the twenty samples were above the nitrate trigger limit (10 mg/L). Wells with high nitrate concentrations are primarily located around the Turlock area (purple dots).

The Coalition provided groundwater trend monitoring results to those members who are part of the network in mid-October. The results counted toward the members' requirement to sample their domestic well.

Map of 2019 groundwater quality trend monitoring results for Nitrate + Nitrite as N



ESJWQC Groundwater Quality Trend Monitoring Well Network

ESJWQC

Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
Projection: property=Lambert Conformal Conic
Units: Foot U
Service Layer Credits: Shaded Relief: Copyright(c) 2014 Esri
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads - ESRI

MLJ ENVIRONMENTAL

Scrutiny Intensifies on Pyrethroid Insecticides

High Pyrethroid Use Leading To Surface Water Detections

Pyrethroid insecticides have become a foundational pest management tool since the phasing out of organophosphate insecticides such as diazinon and chlorpyrifos (Lorsban, Lock-On among other brand names). Unfortunately, increased agricultural use has led to detections in surface water monitoring throughout the Central Valley, first in sediment sampling of waterways beginning in the early 2000s and in the past two years through a more sensitive analysis used on water column samples. What this means to ESJWQC members and the coalition annual budget when pyrethroids are found is additional follow-up sampling costs and triggering of surface water management plans.

The ultra-sensitive approach used to analyze for pyrethroids in the water column came about through a change in Regional Water Board regulations . ESJWQC initiated the new technique in 2017 and to date, monthly sampling at Core sites detected pyrethroids in 12 events at levels above standards. These detections are leading to additional sampling in represented sites beginning in 2021 and additional costs in subsequent years.

Based on the waterway characteristics and adjacent crops where pyrethroids are being found, it's believed that spray drift from orchard air blast sprayers may be a significant contributor. When pyrethroids were first causing sediment toxicity in coalition waterways in the early 2000s, many of the exceedances were believed to originate from irrigation runoff carrying sediment from treated fields. With the widespread adoption of drip and microsprinkler irrigation over the last 10-15 years, runoff in the coalition region is virtually nonexistent. This leads to the conclusion that spray drift from orchards adjacent to waterways may be the main source of the detections. And while only small amounts of drift may travel into a waterway, the new analytical technique can detect levels measured in parts per trillion.

ESJWQC members are encouraged to use extreme care when spraying pyrethroids near waterways and follow management practices that minimize off-site movement. Contact your coalition representative for more information about these practices.

New Pyrethroid Monitoring Requirements

The Pyrethroid Control Plan was adopted on June 8, 2017 by the Central Valley Regional Water Quality Control Board (Basin Plan Amendment for the Control of Pyrethroid Pesticide Dischargers; Resolution R5-2017-0057). The regulation applies to both irrigated agriculture and urban dischargers such as Publicly Owned Treatment Works (POTWs) and encompasses both water column and sediment monitoring.

Water column analysis is focused on six pyrethroids: bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin and permethrin.

An exceedance of pyrethroid concentrations is determined using a new technique called the chronic additive pyrethroid Concentration Goal Unit (CGU). The CGU is calculated by an equation that sums concentrations of the six pyrethroids in relation to each pyrethroid's respective chronic concentration goal. If the sum results in a value above one (1), then it is considered an exceedance.

The Coalition began using the new technique for pyrethroids in October 2017 and through September 2019, there were 12 exceedances of the chronic CGU in ESJWQC-sampled Core monitoring sites.

Pyrethroid exceedances at Core sites trigger additional sampling at Represented sites. This leads to additional monitoring and analytical costs. Beginning in October 2019 through September 2020, there are 654 pyrethroid analyses scheduled as a result of the exceedances at the 12 Core sites.

A second pyrethroid test triggered by the new regulation is monitoring for water column toxicity to H. azteca, an aquatic organism sensitive to pyrethroids (the same organism used in sediment toxicity tests). This additional test will be performed concurrently with the pyrethroid test where the CGU analysis is performed. The toxicity test is expected to cost approximately $800 per test. However, the start date for the toxicity test has been delayed until October 2020 so a more precise laboratory analytical method can be developed.

Pyrethroid Sediment Toxicity Successes in Coalition Waterways

Central Valley Coalitions began monitoring for sediment toxicity in 2004 using the amphipod Hyalella azteca, an aquatic invertebrate, as an indicator species. H. azteca is one of the most sensitive species to pyrethroids. If a sediment sample is toxic to H. azteca, then it is likely due to high pyrethroid concentrations in the sediment. A sediment sample is considered toxic to H. azteca if 80% or less of the organisms survive the test compared to the control sample.

From 2004 through 2019, there were 420 sampling events where the ESJWQC monitored for sediment toxicity to H. azteca. Ten percent or 42 samples showed sediment toxicity with the most recent in September 2019.

When there are two or more toxic samples at a monitoring location within three years, the Coalition is required to initiate a management plan to address the toxicity issue. The 42 toxic samples led to initiation of six management plans for sediment toxicity to H. azteca at the six sampling sites. The Coalition can petition to complete a management plan if no toxicity is found after three years of monitoring. As of 2019, the Coalition has completed all six management plans for sediment toxicity to H. azteca.

Pyrethroid Characteristics

Pyrethroids are a group of synthetic insecticides analogous to the natural pesticide pyrethrum, which is produced by chrysanthemum flowers. Pyrethroids have been used for more than 20 years to control agricultural and household pests but have become increasingly popular due to recent restrictions to organophosphate insecticides. Today, pyrethroids are found in over 3,500 registered products, many of which are widely used in agriculture as well as households, including on pets and treated clothing. Based on Department of Pesticide Regulation data, more than 120,000 pounds (active ingredient) of pyrethroids were applied in 2018 and 2019.

Pyrethroids can have adverse effects on aquatic life even at very low concentrations. A physical characteristic of pyrethroids is they tend to adhere or stick strongly to soil particles. The mode of transport for pyrethroids into the Coalition waterways includes both spray drift, irrigation/storm runoff and sediment particle runoff. Once bound to sediment in waterways, pyrethroids can be found at detectable levels for up to 180 days.

Pyrethroid Active Ingredients* Regulated Under Pyrethroid Control Program

Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-cyhalothrin	Permethrin
Aceto	Tombstone	Mustang	Asana XL	Lambda- CY AG	First Choice
Bifen	Decathlon	Stallion		Silencer	Stiletto
Bifenture				Warrior II	Permethrin
Fanfare				Beseige	
Sniper					

*Commercial product names listed are not intended to be comprehensive for each active ingredient. Check with supplier or PCA for additional commercial product names.

2019 Water Quality Improvement Highlight

Lateral 2½ near Keyes Road (Stanislaus County)

Site Description

Lateral 2½ near Keyes Rd is a monitoring site in Stanislaus County. The site has been monitored by the Coalition continuously since 2008. Lateral 2½ near Keyes Rd site subwatershed is located in the western portion of the Coalition region just south of the Tuolumne River and East of the San Joaquin River. The site subwatershed includes 31,810 irrigated acres and extends east past the City of Modesto to Turlock Lake. Land use in this site subwatershed is dominated by deciduous fruits and nuts but also includes vineyards, pasture, and row crops.

Management Plans

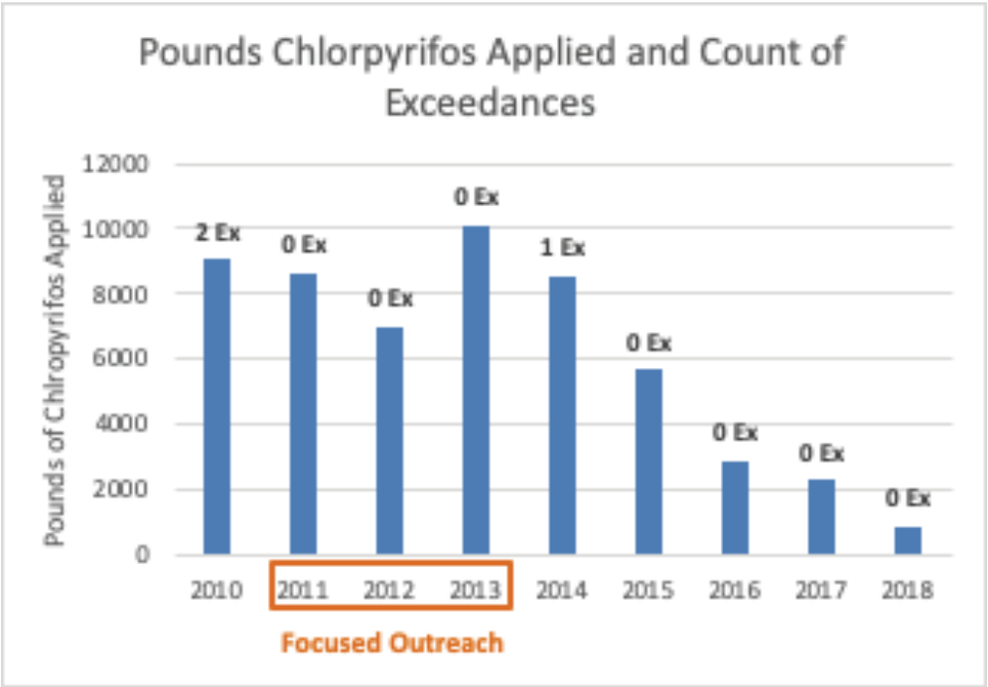
Management plans were first established in 2009 and the management plan for chlorpyrifos began in 2011; Management Plan Monitoring began in 2011 and continued through the 2018 WY. The last exceedances of pesticide standards were in 2014 for chlorpyrifos. When a management plan is initiated, the Coalition conducts additional outreach to members in the watershed in an effort to prevent future exceedances. Management plans are considered completed by the Regional Water Board after three consecutive years of no exceedances.

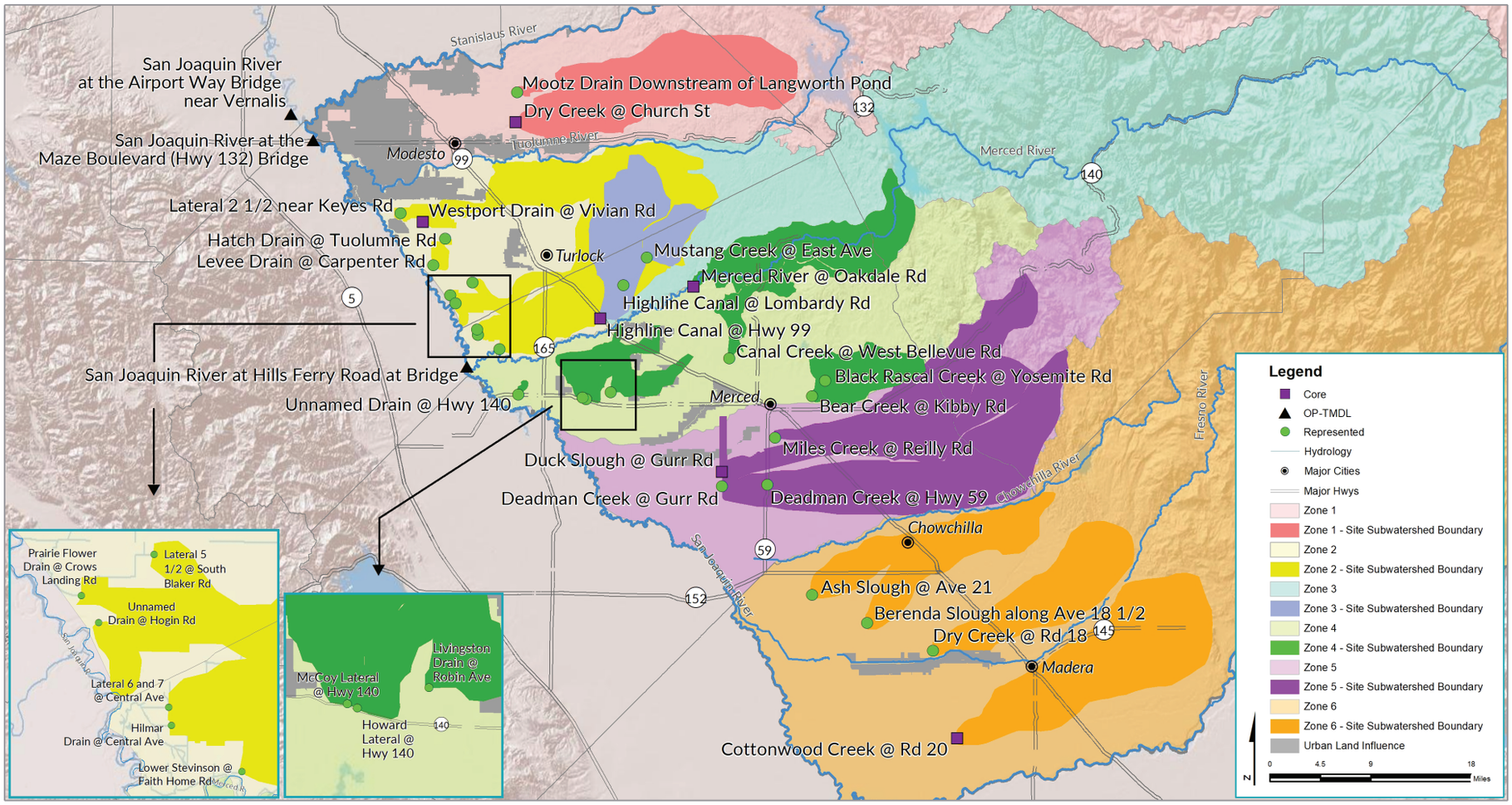
Outreach and Education

From 2011 through 2013, Coalition representatives met individually with twenty-five members farming 1,826 irrigated acres associated with exceedances that occurred in 2009 and 2010. After 2014 when this "Focused Outreach" was completed, there were no more exceedances for chlorpyrifos. As the chart below indicates, a contributing factor was growers' reduction in use of insecticides containing the active ingredient chlorpyrifos after 2013. Growers implemented practices designed to reduce spray drift and irrigation drainage which also contributed to the elimination of exceedances.

Management Plan Completion

As a result of three years monitoring with no exceedances of chlorpyrifos, the Coalition petitioned the Regional Water Board for the completion of the chlorpyrifos management plan in 2017. The management plan was approved for completion in 2018; the Coalition removed chlorpyrifos management plan monitoring beginning with the 2019 WY.





ESJWQC 2019 WY Monitoring Sites Zone Boundaries & Urban Land Influence

ESJWQC

Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
Projection: property=Lambert Conformal Conic
Units: Foot US
Service Layer Credits: Shaded Relief: Copyright(c) 2014 Esri
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads - ESRI

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Coalition Monitoring Sites

"X" indicates sampling occurred during the years specified (October 2015 – September 2019)

Zone	Site Type	Site Name	County	Water Years (October – September)				
				2015	2016	2017	2018	2019
1	Core	Dry Creek @ Church St	Stanislaus	X	X	X	X	X
	Represented	Mootz Drain Downstream of Langworth Pond	Stanislaus	X	X	X	X	
2	Core	Westport Drain @ Vivian Rd	Stanislaus	X	X	X	X	X
	Represented	Hatch Drain @ Tuolumne Rd	Stanislaus	X	X	X	X	X
	Represented	Hilmar Drain @ Central Ave	Merced	X	X	X	X	X
	Represented	Lateral 2 1/2 near Keyes Rd	Stanislaus	X	X	X	X	X
	Represented	Lateral 5 1/2 @ South Blaker Rd	Stanislaus	X	X	X	X	X
	Represented	Lateral 6 and 7 @ Central Ave	Merced	X	X	X	X	X
	Represented	Levee Drain @ Carpenter Rd	Stanislaus	X	X	X	X	X
	Represented	Lower Stevinson @ Faith Home Rd	Merced	X	X	X	X	X
	Represented	Prairie Flower Drain @ Crows Landing Rd	Stanislaus	X	X	X	X	X
	Represented	Unnamed Drain @ Hogin Rd	Stanislaus	X	X	X	X	X
3	Core	Highline Canal @ Hwy 99	Merced	X	X	X	X	X
	Represented	Highline Canal @ Lombardy Rd	Merced	X				
	Represented	Mustang Creek @ East Ave	Merced	X	X	X	X	X
4	Core	Merced River @ Oakdale Rd	Merced	X	X	X	X	X
	Represented	Bear Creek @ Kibby Rd	Merced					X
	Represented	Black Rascal Creek @ Yosemite Rd	Merced	X	X	X	X	X
	Represented	Canal Creek @ West Bellevue Rd	Merced	X	X	X	X	
	Represented	Howard Lateral @ Hwy 140	Merced	X	X	X	X	X
	Represented	Livingston Drain @ Robin Ave	Merced	X	X	X	X	X
	Represented	McCoy Lateral @ Hwy 140	Merced				X	X
	Represented	Unnamed Drain @ Hwy 140	Merced	X	X	X		X
5	Core	Duck Slough @ Gurr Rd	Merced	X	X	X	X	X
	Represented	Deadman Creek @ Gurr Rd	Merced	X	X	X	X	X
	Represented	Deadman Creek @ Hwy 59	Merced	X	X	X	X	X
	Represented	Miles Creek @ Reilly Rd	Merced	X	X	X	X	X
6	Core	Cottonwood Creek @ Rd 20	Madera	X	X	X	X	X
	Represented	Ash Slough @ Ave 21	Madera	X	X	X	X	X
	Represented	Berenda Slough along Ave 18 1/2	Madera	X	X	X	X	X
	Represented	Dry Creek @ Rd 18	Madera	X	X	X	X	X

Coalition Monitoring Results October 2018 through September 2019

Monitoring Location	Constituent	DO+	pH	SC	E. coli	Ammonia	Nitrate + Nitrite	Copper	Pyrethroids	Algae	Sediment Amphipod	Discharge
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	700 µmhos/cm	235 MPN/100	1.5 mg/L (variable)	10 mg/L	µg/L (variable)	Chronic Goal Unit > 1	Toxicity	Toxicity	Cubic Feet Per Second
	Sample Date											
Ash Slough @ Ave 21	1/7/2019											Dry
	2/6/2019											Dry
	3/8/2019		8.56									NM
Bear Creek @ Kibby Rd	6/11/2019											NM
	7/9/2019											NM
	8/13/2019											NM
	9/10/2019											NA
Berenda Slough along Ave 18 1/2	1/7/2019											Pool
	2/6/2019											Pool
	3/8/2019		9									NM
	4/16/2019							1.8 (1.7)				NM
Black Rascal Creek @ Yosemite Rd	3/8/2019											NM
	4/16/2019	6.48										0
	5/14/2019	5.69										2.71
	9/10/2019	5.46	6.19									NA
Cottonwood Creek @ Rd 20	10/9/2018											Dry
	11/7/2018											Dry
	11/30/2018											Dry
	1/7/2019											Pool
	2/6/2019											Dry
	3/8/2019											38.09
	4/16/2019							5.6 (2.3)				3.19
	5/14/2019											3.79
	6/11/2019	2.91			344.8				3			0.51
	7/9/2019											1.95
	8/13/2019											4.18
	9/10/2019				1732.9							15.63
Deadman Creek (Dutchman) @ Gurr Rd	11/30/2018											Pool
	1/7/2019											Pool
	2/6/2019							4.4 (4.3)				NM
	3/8/2019											14.63
	4/16/2019											0
	9/10/2019	5.21										0
Deadman Creek @ Hwy 59	1/7/2019											Pool
	2/6/2019							5.8 (4.8)				NM
	3/8/2019											17.95
	4/16/2019											Dry

Coalition Monitoring Results October 2018 through September 2019

Monitoring Location	Constituent	DO*	pH	SC	E. coli	Ammonia	Nitrate + Nitrite	Copper	Pyrethroids	Algae	Sediment Amphipod	Discharge
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	700 µmhos/cm	235 MPN/100	1.5 mg/L (variable)	10 mg/L	µg/L (variable)	Chronic Goal Unit > 1	Toxicity	Toxicity	Cubic Feet Per Second
	Sample Date											
	7/9/2019	4.47										2.32
	8/13/2019											Dry
Dry Creek @ Church St	10/9/2018	6.37	8.67									15.27
	11/7/2018				770.1							6.04
	11/30/2018				>2419.6							0.75
	1/7/2019				387.3							1.53
	2/6/2019				>2419.6							NM
	3/8/2019				>2419.6							NM
	4/16/2019	5.92			248.9							8.48
	5/14/2019	5.95			435.2							35.50
	6/11/2019	5.2			>2419.6	3.9						6.22
	7/9/2019	6.37			461.1	3.1			3			14.08
	8/13/2019	6.13			770.1							21.04
	9/10/2019								2			22.19
Dry Creek @ Rd 18	1/7/2019											Pool
	2/6/2019							15 (6.1)				NM
	3/8/2019							14 (11)				41.00
	4/16/2019							4.8 (2.6)				NM
Duck Slough @ Gurr Rd	10/9/2018											0.88
	11/7/2018											0.00
	11/30/2018											Pool
	1/7/2019											Pool
	2/6/2019				>2419.6							NM
	3/8/2019				2419.6							NM
	4/16/2019											6.17
	5/14/2019	6.78										16.60
	6/11/2019								10			2.07
	7/9/2019	6.37			365.4							21.68
	8/13/2019				275.5							22.36
	9/10/2019											4.31
Hatch Drain @ Tuolumne Rd	11/30/2018	1.00										NA
	1/7/2019	4.40		1637								NA
	2/6/2019			1535								0
	5/14/2019	2.9		1338								0
	7/9/2019	0.43		1067								0
	9/12/2019	0.78		1614								0
Highline Canal @ Hwy 99	10/9/2018											37.44
	11/7/2018		8.64									2.43
	11/30/2018											0.13

Coalition Monitoring Results October 2018 through September 2019

Monitoring Location	Constituent	DO+	pH	SC	E. coli	Ammonia	Nitrate + Nitrite	Copper	Pyrethroids	Algae	Sediment Amphipod	Discharge
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	700 µmhos/cm	235 MPN/100	1.5 mg/L (variable)	10 mg/L	µg/L (variable)	Chronic Goal Unit > 1	Toxicity	Toxicity	Cubic Feet Per Second
	Sample Date											
	1/7/2019											Pool
	2/6/2019				517.2	5		12 (7.4)				9.61
	3/8/2019				>2419.6	2.6		15 (9.0)				54.67
	4/16/2019				365.4				2			61.92
	5/14/2019				613.1							63.89
	6/11/2019								2			115.62
	7/9/2019								2			124.41
	8/13/2019								2			53.93
	9/12/2019											50.13
Hilmar Drain @ Central Ave	1/7/2019			802								0
	2/6/2019	6.3		1699								0
	4/16/2019	5.84		1100								NA
	5/14/2019	3.28		937								0
	7/9/2019	3.55		965								NA
	9/10/2019	6.88		1091						Toxic		NA
Howard Lateral @ Hwy 140	1/7/2019											Pool
	2/6/2019											Pool
	4/16/2019											16.75
	7/9/2019											17.60
	9/12/2019											NA
Lateral 2 1/2 near Keyes Rd	11/30/2018											NA
	4/16/2019											NA
	5/14/2019											NA
	6/11/2019											NA
	7/9/2019									Toxic		NA
	8/13/2019											NA
	9/12/2019		6.42									8.56
Lateral 5 1/2 @ South Blaker Rd	10/9/2018											NA
	11/30/2018			725						Toxic		NA
	1/7/2019			1422						Toxic		16.48
	2/6/2019			1328						Toxic		7.38
	3/8/2019											NA
	4/16/2019											NM
	5/14/2019											NA
	6/11/2019											NA
	7/9/2019									Toxic		NA
	8/13/2019											NA
	9/10/2019											NA
Lateral 6 and 7 @ Central Ave	1/7/2019			1507								NM

Coalition Monitoring Results October 2018 through September 2019

Monitoring Location	Constituent	DO+	pH	SC	E. coli	Ammonia	Nitrate + Nitrite	Copper	Pyrethroids	Algae	Sediment Amphipod	Discharge
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	700 µmhos/cm	235 MPN/100	1.5 mg/L (variable)	10 mg/L	µg/L (variable)	Chronic Goal Unit > 1	Toxicity	Toxicity	Cubic Feet Per Second
	Sample Date											
	2/6/2019	6.17		1118								NM
	4/16/2019	6.95		744								2.62
	5/14/2019	3.86		1103								24.48
	6/11/2019											NM
	7/9/2019		8.93									NM
	8/13/2019											NM
	9/10/2019											NM
Levee Drain @ Carpenter Rd	2/6/2019			1431								0
	6/11/2019	0.23		919								NA
Livingston Drain @ Robin Ave	11/30/2018							4.7 (1.9)				NM
	1/7/2019							3.2 (2.3)				9.62
	2/6/2019							4.0 (1.9)				NM
	3/8/2019							4.0 (2.6)				4.77
	9/12/2019	6.02									Toxic	NA
Lower Stevinson @ Faith Home Rd	10/9/2018											1.84
	11/7/2018			960								4.42
	1/7/2019											0.88
	2/6/2019		8.62									0.08
	4/16/2019											-1.90
	5/14/2019											4.97
	6/11/2019											24.75
	7/9/2019			717								3.1
	8/13/2019											8.30
McCoy Lateral @ Hwy 140	11/7/2018											Dry
	4/16/2019											5.90
	5/14/2019		8.59									9.91
	6/11/2019											3.64
	9/12/2019											NA
Merced River @ Oakdale Rd	10/9/2018											177
	11/7/2018											183
	11/30/2018											238
	1/7/2019											91
	2/6/2019				365.4							312
	3/8/2019											1934
	4/16/2019											1724
	5/14/2019											2111
	6/11/2019											2440
	7/9/2019								2			195
	8/13/2019	6.36										283

Coalition Monitoring Results October 2018 through September 2019

Monitoring Location	Constituent	DO†	pH	SC	E. coli	Ammonia	Nitrate + Nitrite	Copper	Pyrethroids	Algae	Sediment Amphipod	Discharge
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	700 µmhos/cm	235 MPN/100	1.5 mg/L (variable)	10 mg/L	µg/L (variable)	Chronic Goal Unit > 1	Toxicity	Toxicity	Cubic Feet Per Second
	Sample Date											
	9/10/2019											954
Miles Creek @ Reilly Rd	1/7/2019											0.62
	5/14/2019											3.89
Mustang Creek @ East Ave	10/9/2018											Dry
	11/7/2018											Dry
	11/30/2018											Pool
	1/7/2019			799								-0.05
	3/8/2019	6.16						19 (9.7)				6.41
	7/9/2019	3.31										0.09
	9/10/2019	3.74										0.07
Prairie Flower Drain @ Crows Landing Rd	11/30/2018	0.16		1716						Toxic		NA
	1/7/2019	3.59		3085								NA
	2/6/2019	2.54		1784						Toxic		0
	3/8/2019	3.31		2903								0.15
	5/14/2019	5.88		2250								0
	6/11/2019	0.63		1426								0
	7/9/2019	0.37		1007								0
	8/13/2019	0.15		1575								0
	9/12/2019	1.23		1825								0.61
Unnamed Drain @ Hogin Rd	2/6/2019	6.13		999								0
	3/8/2019	3.26		2401								NM
	6/11/2019	0.99										NA
	7/9/2019	2.7		2023								0
Unnamed Drain @ Hwy 140	9/12/2019											3.51
Westport Drain @ Vivian Rd	10/9/2018	0.48		1028			31					3.22
	11/7/2018	2.50		1021			30					2.23
	11/30/2018	3.91		880	1299.7		27					8.62
	1/7/2019			1181			28					1.37
	2/6/2019			1030			27			Toxic		1.28
	3/8/2019	6.5		1059			28			Toxic		1.98
	4/16/2019	4.72					27					2.44
	5/14/2019	4.08		1034			31					NM
	6/11/2019	4.63		951	866.4		26					4.53
	7/9/2019	5.72		967	770.1		26					1.69
	8/13/2019	3.65		1002			25					NM
	9/12/2019	1.86		1171			28					0

DO†- The WQTL for DO is <5 mg/L for Ash Slough @ Ave 21, Berenda Slough @ Ave 2 1/2, Cottonwood Creek @ Rd 20, and Dry Creek @ Rd 18.
Dry - No water at site; no samples collected.
Pool – Puddle-like conditions, no samples collected.
NM-No measurement: Too deep to measure flow or toxicity monitoring only.

Monitoring Constituents Definitions

Dissolved Oxygen (DO): DO criterion is protective of aquatic life: (min. of 7 mg/L). DO levels are affected by water temperature, photosynthesis & respiration. Added nutrients can stimulate algae production which dies and breaks down by microbial activity. The activity requires oxygen, depleting DO and resulting in an inability to support aquatic communities.

pH: Power of Hydrogen (pH) measures acidic or basic levels in a solution. Acceptable range = 6.5-8.5. Water temperature, photosynthesis & respiration can affect levels. Fertilizers & pesticides can affect pH of water/ soil.

Specific Conductance (SC): A measure of salt and is measured in µS/cm. SC is an indirect measure of the presence of ions such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium and iron. The SC standard (700 µS/cm) is protective of sensitive agricultural crops such as beans.

Ammonia: Total ammonia consists of the unionized (NH3) form plus the ionized (NH4+) form also called ammonium. Ammonium can enter a water body through direct discharge from agricultural fertilizers or animal waste, discharges from waste water treatment plants, or from the breakdown of organic matter in the stream. In soils, ammonium from fertilizers is typically converted to nitrite and then to nitrate over a short period of time. Exceedances of the ammonia standard are based on water temperature and pH which affect the level at which ammonia is toxic to aquatic life. Regardless of the water temperature or pH, all ammonia concentrations above 1.5 mg/L are exceedances of the drinking water standard.

Nitrate + Nitrite: Potential sources include runoff of fertilizers or organic matter from irrigated pasture, leaking septic systems, waste water treatment plant effluent and animal waste. Nitrate and nitrite are very soluble and can enter surface or groundwater with irrigation and/or storm water. Animal waste can be converted to nitrate by nitrifying bacteria. Sources of animal waste include dairies, poultry, pasture and/or wildlife.

E. coli: Common bacterium in intestinal tracts and voided in fecal matter. E. coli in water is compared to the water quality standard protective of recreational activities (235 MPN/100mL). E. coli may persist in presence of oxygen for periods of time after being voided. Any feces voiding species of vertebrate can contribute E. coli to surface waters. Potential sources: leaky septic systems or sewer lines, waste water treatment plant discharge, application of biosolids to ag land, defecation in or near waterbodies, dairies, manure or poultry operations.

Arsenic: Arsenic is found in sodium cacodylate which is applied by agriculture for broadleaf weed control and as a cotton defoliant. California Department of Pesticide Regulation records indicate no agricultural use of sodium cacodylate across the Coalition region between 1998 and 2010. Exceedances of the Arsenic WQTL can be attributed to legacy pesticide use.

Copper: Dissolved or sediment bound in water. Measurement of dissolved copper=dissolved form only measurement of total copper= both dissolved & bound. Dissolved copper is adjusted for the hardness (CaCO3) in water to determine concentrations that would be toxic to aquatic species. Total copper is also evaluated based on the criteria protective of the drinking water beneficial use.

Molybdenum: Products containing molybdenum are rarely if ever used in the Coalition area. Molybdenum can be a byproduct in copper and tungsten mining and is used in alloys due to its ability to withstand high temperatures, resistance to corrosion, and weldability. The westside region is naturally elevated in molybdenum and tends to be flushed into surface waters during periods of high rainfall. Drains such as Prairie Flower Drain which were constructed to drain shallow ground water and allow agriculture can develop elevated concentrations of molybdenum when the ground water is driven into the channel. In living organisms, molybdenum acts as a metal heteroatom and is present in various enzymes including aldehyde oxidase, sulfite oxidase and xanthine oxidase. Molybdenum can also be found in green beans, eggs, sunflower seeds, wheat flour, lentils and cereal grains. In animal studies chronic ingestion of 10 mg/kg of molybdenum can cause diarrhea, growth retardation, sterility, low birth weight, and gout.

Chlorpyrifos: An organophosphate insecticide used in alfalfa, grapes & orchards (among other crops). Trademarked names include: Govern™, Lock-On™, Lorsban™, NuPhos™, etc. Chlorpyrifos can bind to sediment or remain in water column. The 0.015 µg/L objective is protective of aquatic life.

Malathion: Malathion is an organophosphate insecticide applied to over 100 crops in the United States including alfalfa, rice, cotton, sorghum, wheat, and walnuts. It is also used for structural pest control (mosquito and fruit fly eradication, and home settings). Malathion is easily mixed with water and can be found in both urban and agricultural runoff. Malathion is a prohibited discharge pesticide except under the Rice Coalition Management Plan and any detection of the constituent is considered an exceedance. Malathion is known to be toxic to C. dubia (LC50 = 3.35 µg/L).

Pyrethroids: Are synthetic chemicals based on naturally occurring pyrethrins, found in chrysanthemums. They are an effective and widely used class of chemical for the control of pests. Pyrethroids readily bind to sediment and can also be found in the water column.

Algae toxicity: algae (aquatic plants) are sensitive to herbicides and fungicides. Algae toxicity is measured as percent growth in the sample water compared to the growth in a control treatment.

Fathead minnow toxicity: fathead minnows (fish) are sensitive to ammonia toxicity. At high concentrations pesticides and metals can also cause fish mortality. Fathead minnow toxicity is measured as percent survival within the sample water compared to survival in a control treatment.

Water flea toxicity: water fleas (invertebrates) are especially sensitive to water soluble pesticides such as chlorpyrifos & diazinon. Toxicity is measured as % survival in sample compared to survival in control treatment.

Sediment Toxicity: One species (Hyalella azteca – amphipod) is used in sediment analysis to determine toxicity that may occur to pelagic organisms. Amphipods are sensitive to pyrethroids and other pesticides that are not highly water soluble including some herbicides, fungicides and insecticides. Amphipod toxicity is measured as percent survival within the sediment sample as compared to the survival in a control treatment.

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